

PET Facility News

The University of Texas Southwestern Medical Center at Dallas
*P*ositron *E*mission *T*omography Facility

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Medicare Reimbursement for PET in Thyroid Cancer

Medicare currently approves reimbursement for PET in non-small cell lung cancer, solitary pulmonary nodules, melanoma, lymphoma, colorectal cancer, esophageal cancer, head and neck cancer, breast cancer, cardiac viability, and epilepsy. Recently, approval has also been granted for reimbursement in thyroid cancer. This approval requires that there is a suspicion of recurrence or metastatic disease based upon elevated thyroglobulin levels, but negative whole body scans with radioactive iodine. The effective date for this reimbursement has not yet been set.

In general, well-differentiated thyroid cancer takes up radioactive iodine and is therefore both detectable and treatable with this agent. However, certain cell variants including Hurthle cell and insular cell may not take up iodine. In addition, less well-differentiated cancers may not be detectable with iodine. In these cases, FDG PET may be helpful in detecting recurrent or metastatic disease that may be amenable to surgical resection.



Fused Coronal PET/CT image in a patient with suspected thyroid cancer recurrence. The patient is undergone complete thyroidectomy and I 131 ablation. However, her thyroglobulin level is high. Focal uptake of FDG in the left bed of the thyroid (arrow) represents recurrent thyroid cancer.

Additional indications for PET are currently under consideration and further approvals are anticipated in testicular, ovarian, cervical, pancreatic, small cell lung cancers and in Alzheimer's disease. The review date is September 1, 2003 and decisions will be forthcoming after that.

What is an SUV?

A standard uptake value (SUV) is a relative measure of FDG uptake in tissue. It can be used to compare uptake in normal tissue to uptake in pathologic

tissue. The SUV itself has no units and is calculated by the equation:

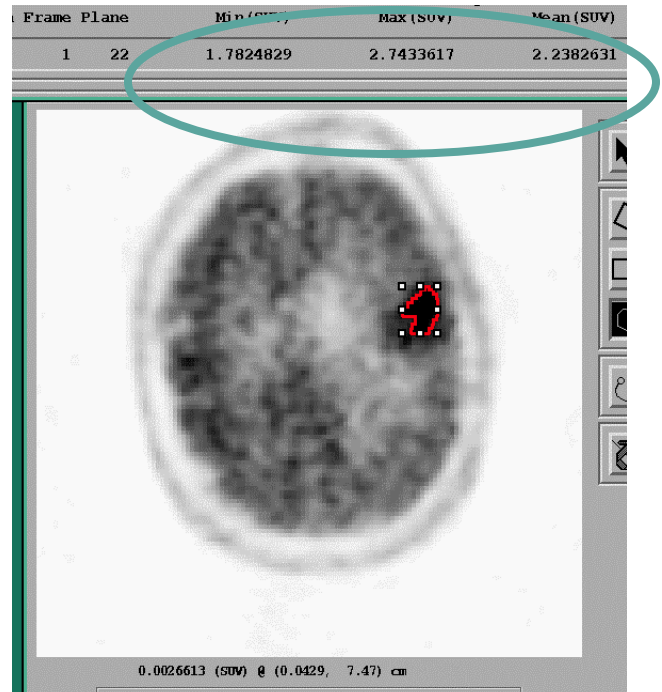
$$\bullet = \frac{\text{Tracer uptake (MBq ml}^{-1}\text{)}}{\text{Administered activity (MBq) / Patient weight (kg) X 1000}}$$

Several factors affect the SUV including the length of time since injection, the patient's blood glucose, the patient's weight and the size of the lesion of interest. SUVs are underestimated in obese patients, hyperglycemic patients and small lesions. The SUV in tumors tends to increase the longer the time since injection as the active transport mechanisms for FDG continue to bring it into cells and the polarized FDG-6-P does not efflux.

The normal value for SUV is tissue dependent and cut off values for malignancy will therefore depend upon the tissue involved. For example, normal lung has an SUV of about 0.7 and pulmonary lesions with SUV greater than 2.5 have a higher probability of malignancy than those below this value. In contrast, normal liver has SUV of about 2.5 so lesions here must have greater uptake to be considered malignant. This latter also points out why some tumors are not well visualized on PET compared to the surrounding tissue, for example hepatocellular carcinomas.

The SUV can be used diagnostically to distinguish malignant tissue from normal and can also be used to assess effectiveness of therapy. Reduction in SUV following therapy is considered a good prognostic sign even if the size of the mass itself on CT does not decrease, as is sometimes the case with lymphoma and testicular cancers.

In summary, SUVs can be helpful guidelines in diagnosis and treatment. There is overlap between malignant and benign processes at lower values and that has to be kept in mind. It seems that in PET, as with sport utility vehicles, there is at least some "rollover" potential!



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